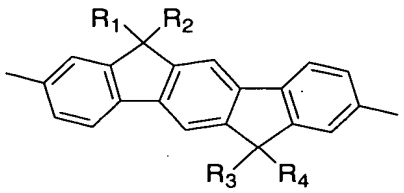
Claims

1. A polymer comprising optionally substituted first repeat units of formula (I):



(I)

wherein R_1, R_2, R_3 and R_4 are selected from hydrogen, alkyl, alkyloxy, aryl, aryloxy, heteroaryl or heteroaryloxy groups, and R_1 and R_2 and / or R_3 and R_4 may be linked to form a monocyclic or polycyclic, aliphatic or aromatic ring system, provided that at least one of R_1, R_2, R_3 and R_4 comprises an aryl or heteroaryl group.

2. A polymer according to claim 1 wherein at least two of R_1, R_2, R_3 and R_4 comprise an aryl or heteroaryl group.

3. A polymer according to claim 1 wherein at least three of R_1, R_2, R_3 and R_4 comprise an aryl or heteroaryl group.

4. A polymer according to claim 1 wherein R_1, R_2, R_3 and R_4 comprise an aryl or heteroaryl group.

5. A polymer according to claim 1 wherein R_1 and R_2 comprise an aryl or heteroaryl group and R_3 and R_4 comprise an alkyl group.

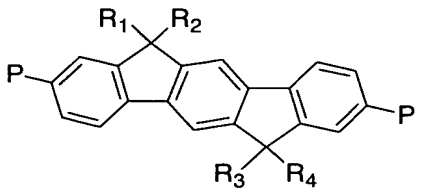
6. A polymer according to any preceding claim wherein said aryl group comprises an optionally substituted phenyl group.

7. A polymer according to any preceding claim wherein said aryl group comprises a 4-octylphenyl group or a 4-*tert*-butyl-phenyl group.

8. A polymer according to any preceding claim comprising a second repeat unit.

9. A polymer according to claim 8 wherein said second repeat unit is selected from triarylamines and heteroaromatics.

10. A monomer comprising an optionally substituted compound of formula (II):



(II)

wherein each P independently represents a polymerisable group and R_1, R_2, R_3 and R_4 are as defined in any one of claims 1-7.

11. A monomer according to 10 wherein each P is independently selected from a reactive boron derivative group selected from a boronic acid group, a boronic ester group and a borane group; a reactive halide group or a moiety of formula -O-SO_2-Z wherein Z is selected from the group consisting of optionally substituted alkyl and aryl.

12. A process for preparing a polymer comprising a step of reacting a first monomer as defined in any one of 10 or 11 and a second monomer that may be the same or different from the first monomer under conditions so as to polymerise the monomers.

13. A process for preparing a polymer according to claim 12 which comprises polymerising in a reaction mixture:

(a) a monomer according to claim 11 wherein each P is a boron derivative functional group selected from a boronic acid group, a boronic ester group and a borane group, and an aromatic monomer having at least two reactive functional groups independently selected from halides or a moiety of formula -O-SO_2-Z ; or

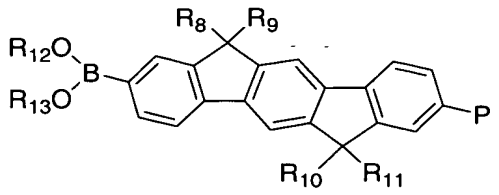
(b) a monomer according to claim 11 wherein each P is independently selected from the group consisting of reactive halide functional groups functional groups independently selected from halides and a moieties of formula -O-SO_2-Z and Z is as defined in claim 11, and an aromatic monomer having at least two boron derivative functional groups selected from boronic acid groups, boronic ester groups and borane groups; or

(c) a monomer according to claim 11 wherein one P is a reactive halide functional group or a moiety of formula –OSO_2-Z and Z is as defined in claim 11, and the other P is a boron derivative functional group selected from a boronic acid group, a boronic ester group and a borane group,

wherein the reaction mixture comprises a catalytic amount of a catalyst suitable for catalysing the polymerisation of the aromatic monomers, and a base in an amount sufficient to convert the boron derivative functional groups into boronate anionic groups.

14. An organic light emitting device comprising a polymer according to any of claims 1 to 9.

15. A monomer comprising an optionally substituted repeat unit of formula (III):



(III)

wherein R_8, R_9, R_{10}, R_{11}, R_{12} and R_{13} are the same or different and independently represent hydrogen or are selected from alkyl, alkyloxy, aryl, aryloxy, heteroaryl or heteroaryloxy groups, and R_1 and R_2 and / or R_3 and R_4 may be linked to form a monocyclic or polycyclic, aliphatic or aromatic ring system; one or more of the pairs of R_8 and R_9, R_{10} and R_{11} or R_{12} and R_{13} may be linked to form a ring; and P is as defined in claim 10 or 11.

16. A monomer according to claim 15 wherein R_8, R_9, R_{10} and R_{11} are independently selected from the group consisting of optionally substituted alkyl, alkoxy, aryl, aryloxy, heteroaryl or heteroaryloxy.

17. A monomer according to claim 15 or 16 wherein P is selected from the group consisting of functional halogens, a monovalent unit of formula $-OSO_2Z$ or a monovalent unit of formula $-B(OR_{14})(OR_{15})$ wherein R_{14} and R_{15} are the same or different and independently represent hydrogen or a substituent R_{12} and R_{13} as defined in claim 15 and may be linked to form a ring; and Z is as defined in claim 11.

18. A monomer according to any of claims 15 - 17 wherein R_{12}, R_{13}, R_{14} and R_{15} are the same or different and are selected from the group consisting of hydrogen and optionally substituted alkyl.

19. A monomer according to claim 18 wherein R_{12} and R_{13} and / or R_{14} and R_{15} are linked to form an optionally substituted ethylene group.

20. A process for preparing a polymer which comprises polymerising in a reaction mixture:

(a) a monomer according to any one of claims 15-19 wherein P is a group of formula $-B(OR_{14})(OR_{15})$ and R_{14} and R_{15} are as defined in claim 17, and an aromatic monomer having at least two reactive functional groups independently selected from halide or moieties of formula $-O-SO_2-Z$ and Z is as defined in claim 11; or

(b) a monomer according to any one of claims 15-19 wherein P is a reactive halide functional group or a moiety of formula $-O-SO_2-Z$ and Z is as defined in claim 11,

wherein the reaction mixture comprises a catalytic amount of a catalyst suitable for catalysing the polymerisation of the aromatic monomers, and a base in an amount sufficient to convert the boron derivative functional groups into boronate anionic groups.

21. A switching device comprising an oligomer or polymer according to any one of claims 1 – 9.

22. A field effect transistor comprising an insulator having a first side and a second side; a gate electrode located on the first side of the insulator; a polymer according to any one of claims 1 – 9 located on the second side of the insulator; and a drain electrode and a source electrode located on the polymer.

23. An integrated circuit comprising a field effect transistor according to claim 22.

24. A photovoltaic cell comprising a polymer according to any one of claims 1 – 9.